CLAIMS

1. A rotor for a rotary electric machine, comprising:

a pair of pole cores in each of which a plurality of claw-shaped magnetic poles having a tapered shape are formed at a uniform angular pitch in a circumferential direction on an outer circumferential edge portion of a cylindrical base portion such that a direction of taper of said claw-shaped magnetic poles is aligned in an axial direction, said pair of pole cores being constructed by placing end surfaces of said base portions in contact with each other such that said claw-shaped magnetic poles intermesh;

a bobbin constructed into an annular shape having an angular C-shaped cross section by disposing first and second flange portions so as to extend radially outward from two axial end portions of a cylindrical drum portion, said bobbin being mounted to said base portions so as to be held between root portions of said claw-shaped magnetic poles of said pair of pole cores; and

a rotor coil having a coil field constructed by winding a coil wire having a circular cross section onto an outer circumference of said drum portion of said bobbin in multiple layers so as to make columns in each of said layers equal in number in an axial direction,

wherein:

odd numbered layers of said coil field are constructed such that said coil wire is wound for approximately one turn around said drum portion in contact with an inner peripheral wall surface of said first flange portion, then wound into a plurality of columns in an axial direction such that said columns of said coil wire contact each other, and said coil wire in a final column forms a gap S relative to an inner peripheral wall surface of said second flange portion;

even numbered layers of said coil field are constructed such that

said coil wire is wound for approximately one turn around said drum portion in contact with an inner peripheral wall surface of said second flange portion, then wound into a plurality of columns in an axial direction such that said columns of said coil wire contact each other, and said coil wire in a final column forms a gap S relative to an inner peripheral wall surface of said first flange portion; and

said gap S satisfies an expression $D/4 \leq S \leq D/2$ relative to a diameter D of said coil wire.

2. The rotor for the rotary electric machine as set forth in Claim 1, wherein said coil field is constructed such that crossover points formed by said coil wire in radially-adjacent layers do not overlap in a radial direction.

3. The rotor for the rotary electric machine as set forth in Claim 1, wherein coil wire guiding grooves running in a circumferential direction are formed on an outer circumferential surface of said drum portion at an array pitch of D in an axial direction.

4. The rotor for the rotary electric machine as set forth in Claim 3,

wherein said drum portion has a small radius portion in which a wall thickness of said drum portion is formed so as to be thin over a predetermined circumferential range, said small radius portion constituting a region where said coil wire guiding grooves are not formed; and

wherein crossover points formed by said coil wire in radially-adjacent layers are all positioned radially outside said small radius portion without overlapping each other in a radial direction.

5. The rotor for the rotary electric machine as set forth in Claim 4, wherein said small radius portion is formed over a range of greater than or equal to 40 degrees and less than or equal to 80 degrees in a circumferential direction.

6. The rotor for the rotary electric machine as set forth in Claim 1, wherein a plurality of thick-walled ribs are formed on said first and second flange portions of said bobbin.

7. The rotor for the rotary electric machine as set forth in Claim 1, wherein said bobbin is made of nylon 66 containing glass fiber.

8. The rotor for the rotary electric machine as set forth in Claim 1, wherein said coil wire is wound onto an upper portion of said coil field in a plurality of layers having fewer columns than said number of columns in each of said layers of said coil field.

9. A rotor for a rotary electric machine, comprising:

a pair of pole cores in each of which a plurality of claw-shaped magnetic poles having a tapered shape are formed at a uniform angular pitch in a circumferential direction on an outer circumferential edge portion of a cylindrical base portion such that a direction of taper of said claw-shaped magnetic poles is aligned in an axial direction, said pair of pole cores being constructed by placing end surfaces of said base portions in contact with each other such that said claw-shaped magnetic poles intermesh;

a bobbin constructed into an annular shape having an angular C-shaped cross section by disposing first and second flange portions so as to extend radially outward from two axial end portions of a cylindrical drum

portion, said bobbin being mounted to said base portions so as to be held between root portions of said claw-shaped magnetic poles of said pair of pole cores; and

a rotor coil having a coil field constructed by winding a coil wire having a circular cross section onto an outer circumference of said drum portion of said bobbin in multiple layers so as to make columns in each of said layers equal in number in an axial direction,

wherein:

odd numbered layers of said coil field are constructed such that said coil wire is wound for approximately one turn around said drum portion in contact with an inner peripheral wall surface of said first flange portion, then wound into a plurality of columns in an axial direction with a gap G between said coil wire, and said coil wire in a final column forms a gap S relative to an inner peripheral wall surface of said second flange portion;

even numbered layers of said coil field are constructed such that said coil wire is wound for approximately one turn around said drum portion in contact with an inner peripheral wall surface of said second flange portion, then wound into a plurality of columns in an axial direction with a gap G between said coil wire, and said coil wire in a final column forms a gap S relative to an inner peripheral wall surface of said first flange portion; and

said gap S satisfies an expression $S = (D + G)/2$ relative to a diameter D of said coil wire and said gap G.

10. The rotor for the rotary electric machine as set forth in Claim 9, wherein said coil field is constructed such that crossover points formed by said coil wire in radially-adjacent layers do not overlap in a radial direction.

11. The rotor for the rotary electric machine as set forth Claim 9, wherein coil wire guiding grooves running in a circumferential direction are formed on an outer circumferential surface of said drum portion at an array pitch of (D + G) in an axial direction.

12. The rotor for the rotary electric machine as set forth in Claim 11, wherein said gap G is constructed so as to satisfy an expression $0 \leq G \leq 0.04D$.

13. The rotor for the rotary electric machine as set forth in Claim 11,

wherein said drum portion has a small radius portion in which a wall thickness of said drum portion is formed so as to be thin over a predetermined circumferential range, said small radius portion constituting a region where said coil wire guiding grooves are not formed; and

wherein crossover points formed by said coil wire in radially-adjacent layers are all positioned radially outside said small radius portion without overlapping each other in a radial direction.

14. The rotor for the rotary electric machine as set forth in Claim 13, wherein said small radius portion is formed over a range of greater than or equal to 40 degrees and less than or equal to 80 degrees in a circumferential direction.

15. The rotor for the rotary electric machine as set forth in Claim 9, wherein a plurality of thick-walled ribs are formed on said first and second flange portions of said bobbin.

16. The rotor for the rotary electric machine as set forth in Claim 9,

wherein said bobbin is made of nylon 66 containing glass fiber.

17. The rotor for the rotary electric machine as set forth in Claim 9, wherein said coil wire is wound onto an upper portion of said coil field in a plurality of layers having fewer columns than said number of columns in each of said layers of said coil field.